NEKROLOG OBITUARY

Krešimir Humski
1939–1997

Professor Krešimir Humski died suddenly, aged 59, in Bloomington (Indiana, USA) on October 23, 1997 during his visit to Indiana University. He was one of the most prominent Croatian chemists in the last three decades, not only because of his research achievements, but also because of his considerable skills in managing science and in teaching. He was a fascinating lecturer, and students and general audiences enjoyed his educational and science-popularizing lectures.

Krešimir Humski was born in Zagreb, Croatia, on May 23, 1939, the son of Katica (1913–1987) and Danijel Humski (1911–1994). He leaves his wife Franka (they were married in 1963), daughter Jasna (b. 1965), son Damir (b. 1971), brother Ivan and sister Željka.

He received all his education in Zagreb. After completing elementary school (1945–1952), he graduated from the Technical School (1952–1956; here he met his future wife). In 1956, he enrolled in the Technical Faculty, Department of Chemistry, as one of the youngest students in his class, being only seventeen. Soon after that, the Technical Faculty was split into several independent faculties, one being the Faculty of Technology. Here Humski obtained his degree in chemical technology (1961). In 1964, he received an M. Sc. degree from the University of Zagreb. In 1966, after defending his thesis, entitled »Studij mehanizma reakcije termalnog pregrađivanja. Studij mehanizma Cope-ovog i Claisen-ovog pregrađivanja pomoću deuterija i tricija« (Study of the reaction mechanism of thermal rearrangement. Study of the mechanism of Cope and Claisen rearrangements by means of deuterium and tritium), he was granted the degree of Doctor of Chemical Sciences by the University of Zagreb. He carried out research which was the basis of his doctoral thesis in the physical-organic chemistry group at the Rugjer Bošković Institute under the guidance of Professors Dionis E. Sunko and Stanko Borčić (1931–1994; a student of Leopold Ružička (1887–1976) and Vladimir Prelog (1906–1998), Croatian Nobel laureates in chemistry). In those days the physical-organic chemistry group of the Rugjer Bošković Institute was among the three or four leading research groups in physical-organic chemis-

try in the world. Thus, it was from the beginning of his career that he started doing world class research in physical-organic chemistry. His research on the doctoral thesis was interrupted for 11 months (1964–1965) by compulsory military service.

After having obtained his the doctoral degree, Humski went for postdoctoral studies to the USA. He spent two years (1967–1968) as a postdoc in the Department of Chemistry, University of Wisconsin, Madison, working with Professor Harlan L. Goering. Later, he will return there on two occasions (1978, 1982) as a visiting professor. On returning from the USA, he continued for a while his association with the Rugjer Bošković Institute, first as a senior assistant (1969–1970) and then as a research associate until 1972. In 1972, he joined the Faculty of Technology, University of Zagreb, and stayed there until 1983. During his tenure at the Faculty of Technology, he started as a docent (1972–1975), then he became an associate professor (1975–1979) and in 1979 full professor of organic chemistry. Between 1981 and 1983, he was Head of the Chair of Organic Chemistry there. In 1983, Humski joined his mentor and friend Stanko Borčić in the Faculty of Pharmacy and Biochemistry, University of Zagreb, as professor of organic chemistry. The opening appeared after the retirement of the well-known Croatian organic chemist Professor Dragutin Kolbah (1912–1990). There, he also served two years (1987–1989) as Head of the Chair of Organic Chemistry. After the death of Professor Borčić in 1994, he became again Head of the Chair of Organic Chemistry and held this position until he died. He was also Head of the Graduate School of Theoretical and Physical-Organic Chemistry at the University of Zagreb from 1993 until 1996.

Professor Humski held several visiting professorships. Besides his two visiting professorships at the University of Wisconsin (Madison), he was also visiting professor at the fateful Indiana University (Bloomington) on several occasions (1973, 1974, 1975, 1985, 1988).

Krešimir Humski was a member of the Croatian Chemical Society since 1961. In the period from 1970–1972, he was Secretary General of the Croatian Chemical Society and its president from 1992–1994. He was also a member of the American Chemical Society since 1995. He served on the Editorial Board of »Croatica Chemica Acta« from 1971 to 1975. He was the guest editor of a special issue of »Croatica Chemica Acta«, published in 1996 in memory of Professor Stanko Borčić. In 1983, he was vice-chairman and in 1985 chairman of the Meeting of Croatian Chemists.

Humski possessed a rare ability to manage science well at any level. Thus, he was twice (1976–1978, 1980–1981) a successful vice-dean of the Faculty of Technology. Later, he was first a member (1988–1989) and then (1990–1992) director of the Managing Board of the Faculty of Pharmacy and Biochemistry. In 1994, the Ministry of Science and Technology of Croatia appointed him to chair the Council of Natural Sciences and in 1996 to chair the Committee for the Evaluation of the Rugjer Bošković Institute. In these

responsible positions, he was very fair and always ready to help and give advice.

His major research interests were physical organic chemistry and mechanisms of organic reactions. Probably his most important contribution to these areas (judging by literature citations) was a very thorough study of secondary isotope effects in the solvolysis of cyclopentyl derivatives. During his years at the Rugjer Bošković Institute, he studied the Cope and Claisen rearrangements. This work was done in collaboration with Professors Sunko and Borčić. In collaboration with Professor Vernon J. Shiner, Humski developed an efficient multiparameter optimization procedure for the analysis of reaction mechanistic schemes. During his tenure at the Faculty of Pharmacy and Biochemistry he was studying, mostly in collaboration with Professor Borčić, biomimetic polycyclizations. He was also interested in the stereochemistry of selected organic reactions and in spectral studies of organic molecules. Most of his papers were published in leading chemical journals (see the list of his publications below). Humski also published several technical papers and was co-author (with Dr Ivan Hrvoić) of a patent (Nuclear Magnetometers for Earth's Field Measurements Based on Dynamic Polarisation of Nuclei and Free Radical Substance for Use Therein) registered in the USA (U.S.Pat. No. 3, 966, 409, June 29, 1976) and Canada (Canadian Pat. No. 1, 001, 232, Dec. 7, 1976). He also wrote a scholarly biography of Professor Vladimir Njegovan (1884–1971), an important Croatian chemist and the first editor (1926–1933) of »Croatica Chemica Acta«, then called »Arhiv za hemiju i farmaciju« (Archive for Chemistry and Pharmacy), wisely avoiding in his writings and lectures any evaluation of the political side of Njegovan's life.

Humski wrote the first organic chemistry text in Croatia after the Second World War. This was »Reakcijski mehanizmi u organskoj kemiji« (Reaction Mechanisms in Organic Chemistry). It was published in 1974 by »Školska knjiga« of Zagreb as the second book in the series entitled »Modern Chemistry.«

At the end of this brief account of Professor Krešimir Humski, I wish to add a few personal remarks. I met Krešo (this is how he was called by friends) in the first semester of our studies at the Technical Faculty since I also entered that school in 1956. In spite of Krešo being three years younger, we became fast and life-long friends from our very first meeting during the laboratory exercises in crystallography. Meeting him was a lucky event for me because without his help I would have probably never completed work in the Laboratory of Analytical Chemistry. I was hopelessly clumsy and impatient in my laboratory work. However, his most important help, which changed my career completely, happened after we got our degrees. After graduation (he did diploma work in analytical chemistry and I did it in physical chemistry), he went to graduate school and the Rugjer Bošković Institute and I went idealistically to industry. Yet, I was not cut to work in industry and was rather unhappy in the industrial setting. He noticed this and after I had told him the reasons why I was unhappy in indus-

try, he suggested to me to join his laboratory at the Rugjer Bošković Institute. In this laboratory people were doing physical-organic work and were headed by two first-class people, Professors Sunko and Borčić. Krešo talked to Professor Sunko, and he agreed to take me into his laboratory. However, I was again hopelessly clumsy, although Krešo spent a lot of time teaching me the art of organic synthesis. I realized soon enough that organic preparative work was not for me, left the Department of Organic Chemistry and Biochemstry and joined the Department of Physical Chemistry at the Institute. From that point on our careers diverged. Nevertheless, our frendship remained. I was his best man when he married Franka, the sweetheart of his youth in 1963. Although we were very close friends, we did not publish a single paper together but only one technical paper on stereochemistry. His interest was centered on experimental chemistry and mine of theoretical chemistry and thus we never generated a problem of common interest. Now that he is gone I feel like having lost an older brother I have never had.

Nenad Trinajstić

List of Publications of Krešimir Humski

1. K. Humski, S. Borčić and D. E. Sunko:
   Reactions of Cyclopropylmethyl Benzenesulfonate. Energies and Entropies of Activation.
   Croat. Chem. Acta **34** (1962) 249–250.
2. K. Humski, S. Borčić and D. E. Sunko:
   1,3-Hydrogen Migration in the Solvolysis of 2-(D^3 -Cyclopentenyl)-ethyl p-Toluenesulfonate.
   Croat. Chem. Acta **37** (1965) 3–10.
3. K. Humski, S. Borčić and D. E. Sunko:
   Deuterium Scrambling During Stereochemical Equilibration of *endo*- and *exo*-Norbornanol-3,3-d_2.
   Croat. Chem. Acta **38** 55 (1966) 55–56.
4. H. L. Goering and K. Humski:
   Solvolysis of Optically Active 1,2-Dimethyl-exo-2-norbornyl p-Nitrobenzoate.
   J. Amer. Chem. Soc. **90** (1968) 6213–6214.
5. H. L. Goering, C. Brown, S. Chang, J. V. Clevenger and K. Humski:
   Absolute Configurations and Rotations of 1-Methyl-2-methylenenorbornane and 1,2-Dimethyl-2-norbornyl Derivatives.
   J. Org. Chem. **34** (1969) 624–627.
6. R. Malojčić, K. Humski, S. Borčić and D. E. Sunko:
   Thermodynamic Secondary Deuterium Isotope Effect in the Thermal Rearrangement of Biallyl.
   Tetrahedron Lett. **1969**, 2003–2006.

7. K. Humski, T. Strelkov, S. Borčić and D. E. Sunko:
Secondary Deuterium Isotope Effects in the Cope Rearrangement.
Chem. Comm. **1969**, 693–694.

8. H. L. Goering and K. Humski:
On g-Deuterium Isotope Effects in Norbornyl Sistem.
J. Amer. Chem. Soc. **92** (1969) 4594–4595.

9. L. Klasinc and K. Humski:đ
Molecular Orbital Calculations of the Acid-Catalysed Hydrogen Exchange in Substituted Thiofenes.
Z. Naturforschung **25** (1970) 324–325.

10. K. Humski, R. Malojčić, S. Borčić and D. E. Sunko:
Thermodynamic and Kinetic Secondary Isotope Effects in the Cope Rearrangement.
J. Amer. Chem. Soc. **92** (1970) 6534–6538.

11. K. Humski:
β-Deuterium Isotope Effect in Solvolysis of 1,2-Dimethyl-*exo*-2-norbornyl p-Nitrobenzoate.
Croat. Chem. Acta **42** (1970) 501–504.

12. K. Humski and L. Klasinc:
On the Dehydration of BicycloŠ2.2.1.Ć-2-heptanols in the Mass Spectrometer.
J. Org. Chem. **36** (1971) 3057–3059.

13. K. Humski, J. M. Jerkunica, L. Klasinc and J. Marsel:
Mass Spectra of Bicyclo[2.2.1.]-2-heptanols.
Croat. Chem. Acta **44** (1972) 221–228.

14. H. L. Goering, J. V. Clevenger and K. Humski:
Preparation and Stereochemistry of 1-Methyl-2-methylene-benzonorbornene and 1,2-Dimethyl-2-benzonorbornenyl Derivatives.
J. Org. Chem. **37** (1972) 3019–3020.

15. K. Humski, L. Klasinc, D. Kovačević and V. Kramer:
Mass Spectra of Labeled Cyclopentanols.
Croat. Chem. Acta **45** (1973) 363–369.

16. K. Humski, V. Sendijarević and V. J. Shiner, Jr.:
Secondary Deuterium Isotope Effects in Solvolysis of Cyclopentyl p-Brombenzensulfonate. Stereochemistry of E1 and S_N1 Reactions.
J. Amer. Chem. Soc. **95** (1973) 7722–7728.

17. K. Humski, V. Sendijarević and V. J. Shiner, Jr.:
Secondary Deuterium Isotope Effects in Solvolysis of Cyclopentyl p-Brombenzensulfonate in Dioxane-Water Mixtures. Stereochemistry of E1 and S_N1 Reactions.
Croat. Chem. Acta **46** (1974) 93–96.

18. K. Humski, V. Sendijarević and V. J. Shiner, Jr.:
Stereochemistry of Olefin Formation in Cyclopentyl Brosylate Solvolysis.
J. Amer. Chem. Soc. **96** (1974) 6187–6189.

19. H. L. Goering and K. Humski:
Ion-Pair Return Associated with Solvolysis of 1,2-Dimethyl-*exo*-2-norbornyl p-Nitrobenzoate-^{18}O.
J. Org. Chem. **40** (1975) 920–922.

20. K. Humski, V. Sendijarević and V. J. Shiner, Jr.:
Stereochemistry of Solvolytic Substitution of Cyclopentyl p-Bromobenzoate.
J. Amer. Chem. Soc. **98** (1976) 2865–2868.

21. Z. Božić, T. Cvitaš, K. Humski and L. Klasinc:
Photoelectron Spectra of Bromo- and Iodothiophenes.
J. Chem. Soc. Perkin Trans 2 (1977) 1413–1416.

22. V. J. Shiner, Jr., D. A. Nollen and K. Humski:
A Multiparameter Optimization Procedure for the Analysis of Reaction Mechanistic Schemes. Solvolyses of Cyclopentyl p-Bromobenzenesulfonate.
J. Org. Chem. **44** (1979) 2108–2115.

23. R. C. Seib, V. J. Shiner, Jr., V. Sendijarević and K. Humski:
»Solvolysis of cyclopentyl p-Bromobenzenesulfonate in Aqueous Hexafluoroisopropyl Alcohol. Deuterium Rate Effects, Stereochemistry of Substitution and Elimination and Reaction Mechanism«,
J. Amer. Chem. Soc. **100** (1978) 8133–8137.

24. I. Mihel, J. Šistek, S. Borčić, K. Humski and D. E. Sunko:
n-Participation and Secondary Deuterium Isotope Effects in Solvolysis of 1-Aryl-4-methoxy-1-butyl Clorides. Are There Two Distinct k_D Pathways?
J. Org. Chem. **44** (1979) 4091–4096.

25. S. Kantner, K. Humski and H. L. Goering:
On the Solvolysis of 2-Cyclohexenyl 3,5-Dinitrobenzoate and p-Nitrobenzoate in Aqueous Acetone. Introduction of Acyl-Oxygen Cleavage by Basic Buffer Systems.
J. Amer. Chem. Soc. **104** (1982) 1693–1697.

26. M. Bajić, K. Humski, L. Klasinc and B. Ruščić:
Substitution Effects on Electronic Structure of Thiophene.
Z. Naturforschung **40b** (1985) 1214–1218.

27. M. Orlović, K. Humski, S. Borčić and E. Polla:
Rate Enhancement and Secondary b-Deuterium Kinetic Isotope Effects as Criteria of Neighbouring Group Participation. Solvolysis of Some Tertiary Alk-5-enyl Clorides.
Chem. Commun. (1986) 263–264.

28. M. Orlović, O. Kronja, K. Humski, S. Borčić and E. Polla:đ
Rates and Alkyl Group Size in Solvolysis of Alkyl Derivatives.
J. Org. Chem. **51** (1986) 3253–3256.

29. S. Borčić, K. Humski, V. Imper, O. Kronja, M. Orlović and E. Polla:
Lack of Secondary-Deuterium Kinetic Isotope Effect in the Solvolysis of 2-Chloro-2,6,10-trimethyldodeca-6,10-diene. Indication of Extended p-Participation«,
J. Chem. Soc. Perkin Trans. 1 (1989) 1861.

30. O. Kronja, S. Borčić, K. Humski and C. S. Foote:
Solvolytic Behaviour of a Primary Squalene Derivatives.
Croat. Chem. Acta **63** (1990) 193–201.

31. M. Orlović, S. Borčić, K. Humski, O. Kronja, V. Imper, E. Polla and V. J. Shiner, Jr.:
Solvolysis Rates and -Deuterium Secondary Kinetic Isotope Effects of Some Tertiary and Secondary Alk-5-enyl Derivatives Evidence for p-Participation.
J. *Org. Chem*. **56** (1991) 1874–1878.

32. O. Kronja, M. Orlović, K. Humski and S. Borčić:
Lack of Secondary -Deuterium Kinetic Isotope Effect in the Solvolysis of 2-Chloro-3-hydrosqualene. A Case of Extended p-Participation and Indication of Concerted Biomimetic Polycyclization.
J. Amer. Chem. Soc. **113** (1991) 2306–2308.

33. I. Malnar, O. Kronja, K. Humski, and S. Borčić:
Solvolysis Kinetics of 1-Chloro-1-phenyl-5,9,14,18,22-pentamethyl-5,9,13,17,21-tricosapentaene, a Squalene Derivative Indication of Participation.
Croat. Chem. Acta **65** (1992) 547–549.

34. K. Humski, O. Kronja, and S. Borčić:
A Kinetic Approach to the Mechanism of Cationic Polyolefinic Cyclization. Simple and Extended p-Participation.
Croat. Chem. Acta **67** (1994) 171–188.

35. S. Borčić, O. Kronja, K. Humski, and S. Miletić:
Reactivity of Some Tertiary Chlorides with Methoxy and Olefinic Neighboring Group.
Croat. Chem. Acta **69** (1996) 563–568.

36. S. Borčić, K. Humski, O. Kronja, and I. Malnar:
Extended p-Participation in Biomimetic Cyclization of Squalene Derivatives.
Croat. Chem. Acta **69** (1996) 1347–1359.

List of Technical Papers by Krešimir Humski

1. M. Bajić, K. Humski, J. Jendričko i I. Milnović:
   Priprava metil-terc-butiletera (MTBE) dodatka motornim benzinima.
   Kem. ind. **28** (1979) 13–16.
2. S. Arsić, K. Humski, L. Klasinc i R. Marčec:
   Brz i jednostavan postupak za određivanje n-alkana u parafinskim voskovima.
   Kem. ind. **34** (1985) 525–527.
3. K. Humski, V. Imper i N. Trinajstić:
   O stereokemiji i kiralnosti.
   Kem. ind. **35** (1986) 151–160.
4. I. Milnović i K. Humski:
   Primjena metil-terc-butiletera (MTBE) kao dodatka za motorne benzine.
   Goriva i maziva **16** (1977) 11–24.
5. M. M. Kreevoy and K. Humski:
   Organic Reaction Mechanisms.
   Enciclopedia della Chimica, USES, Firence, Italia, 1978, 333–343.
6. K. Humski:
   Heterociklički spojevi.
   Tehnička enciklopedija **6** (1979) 353–362.
7. K. Humski, J. Jendričko, I. Milnović i V. Simončić:
   Sinteza metil-terc-butiletera (MTBE) iz C_3-C_4 rafinerijskog plina i metanola na sulfoniranom stiren/divinilbezen katalizatoru.
   Kem. ind. **31** (1982) 403–410.
8. S. Arsić, V. Butković, K. Humski, L. Klasinc i R. Marčec:
   Određivanje aromatskih spojeva u baznim uljima.
   Nafta (1983) 701–707.
9. K. Humski:
   V. Njegovan – život i rad.
   Spomenica o devedesetoj obljetnici postojanja Agrikulturno-kemijskog zavoda u Križevcima, Matica hrvatska, Kri'evci 1993, str. 31–38.
10. K. Humski:
    Vladimir Njegovan-kemičar i organizator.
    Priroda **86** (1996) 33–37.
11. K. Humski:
    V. Prelog i fizikalno-organska kemija.
    Kem. ind. **46** (1997) 203–204.
12. K. Humski i S. Miletić:
    Retrosintetski pristup organskoj sintezi.
    Kem. ind. **46** (1997) 263–272.